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Title: Seismic Event Detection and Subsurface Characterization Using Large-Scale Machine-Learning Techniques

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Seismic Event Detection and Subsurface Characterization Using Large-Scale Machine-Learning Techniques

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Scientific and Programmatic Impact

Scientific Impact

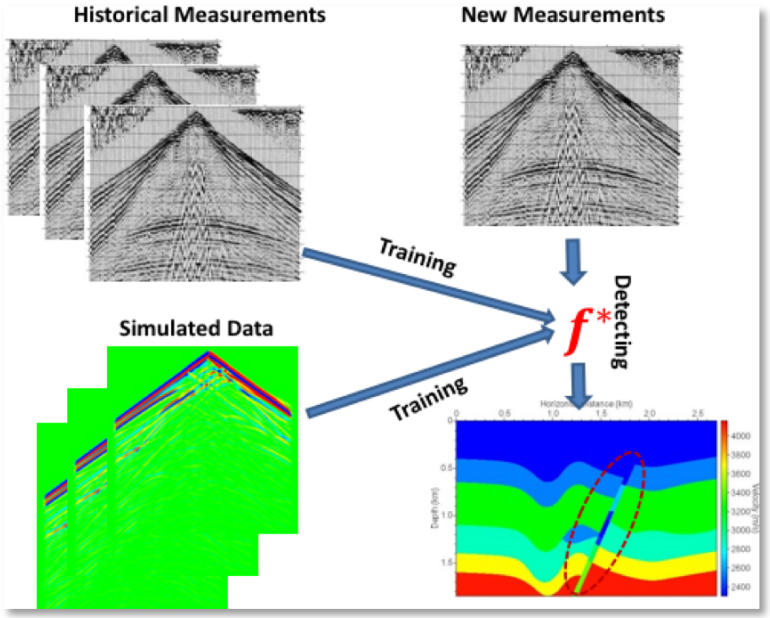
- Accurate subsurface characterization is crucial for all subsurface energy exploration;
- Accurate characterization of uncertain subsurface properties is also critical for monitoring storage of CO2, estimating pathways of subsurface contaminant transport and monitoring potential nuclear-explosions for treaty verification.

Programmatic Impact

- This research will advance our world-leading subsurface sensing capabilities that are crucial for LANL missions in energy security (geothermal energy, oil/gas resource exploration, geologic carbon storage) and nuclear security (facility monitoring, detonation detection).

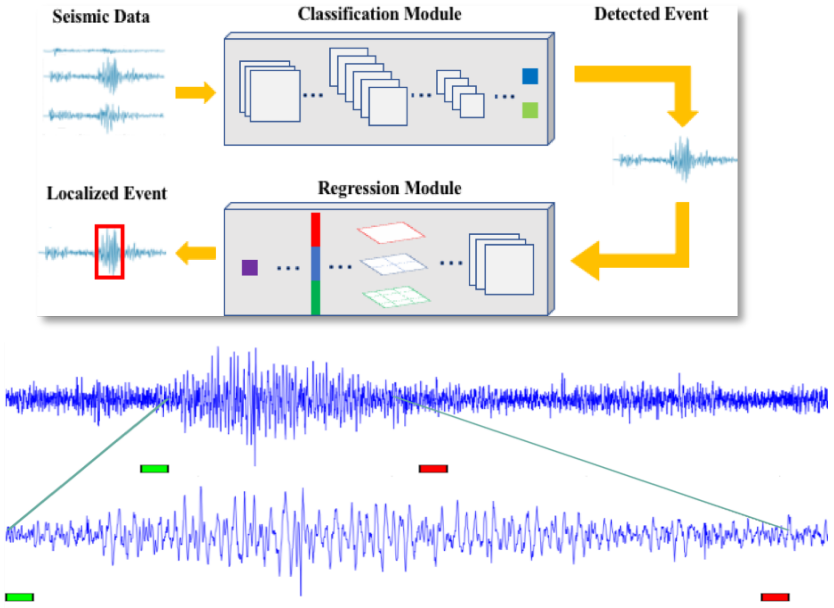
Machine Learning for Subsurface Characterization

A Real-Time Subsurface Geologic Feature Characterization



Lin et. al (GJI and SIAM News, 2018)

DeepDetect: An Automatic Small Events Extraction



Wu et. al (IEEE TRGS, 2018)

Techniques have been successfully applied to various problems and datasets

- Chimayo Geyser Eruption Data; *Wu et. al (SDM, 2018) and Zhou et. al (SDM, 2018);*
- IRIS Community Wavefield Experiment in Oklahoma; *Wu et. al (SSA, 2018);*